Practitioner's Docket No. NVIDP015A/P001241 *PATENT*

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Henry P. Moreton et al.

Application No.: 10/804,434 Group No.: 2628
Filed: March 18, 2004 Examiner: Amin, Jwalant B.
For: Z-TEXTURE MAPPING SYSTEM, METHOD AND COMPUTER PROGRAM PRODUCT

Mail Stop Appeal Briefs – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF
(PATENT APPLICATION--37 C.F.R. § 41.37)

1. This brief is in furtherance of the Notice of Appeal, filed in this case on 09/14/2009.

2. STATUS OF APPLICANT

This application is on behalf of other than a small entity.

3. FEE FOR FILING APPEAL BRIEF

Pursuant to 37 C.F.R. § 41.20(b)(2), the fee for filing the Appeal Brief is:

other than a small entity	$540.00
Appeal Brief fee due	**$540.00**

4. EXTENSION OF TERM

The proceedings herein are for a patent application and the provisions of 37 C.F.R. § 1.136 apply.

Applicant petitions for an extension of time, the fees for which are set out in 37 C.F.R. § 1.17(a)(1)-(4), for two months:

Fee: $490.00

5. TOTAL FEE DUE

The total fee due is:

Appeal brief fee	$540.00
Extension fee (if any)	$490.00
TOTAL FEE DUE	**$1,030.00**

6. FEE PAYMENT

Authorization is hereby made to charge the amount of $1,030.00 to Deposit Account No. 50-1351 (Order No. NVIDP015A).

7. FEE DEFICIENCY

If any additional extension and/or fee is required, and if any additional fee for claims is required, charge Deposit Account No. 50-1351 (Order No. NVIDP015A).

Date: January 14, 2010

Reg. No.: 41,429
Tel. No.: 408-971-2573
Customer No.: 75359

/KEVINZILKA/
Signature of Practitioner
Kevin J. Zilka
Zilka-Kotab, PC
P.O. Box 721120
San Jose, CA 95172-1120

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	
Moreton et al.	Group Art Unit: 2628
Application No. 10/804,434	Examiner: Amin, Jwalant B.
Filed: 03/18/2004	Atty. Docket No.: NVIDP015A/P001241
For: Z-TEXTURE MAPPING SYSTEM, METHOD AND COMPUTER PROGRAM PRODUCT	Date: 01/14/2010

Commissioner for Patents
P.O. Box 1450
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ATTENTION: Board of Patent Appeals and Interferences

APPEAL BRIEF (37 C.F.R. § 41.37)

This brief is in furtherance of the Notice of Appeal, filed in this case on 09/14/2009.

The fees required under § 1.17, and any required petition for extension of time for filing this brief and fees therefor, are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief contains these items under the following headings, and in the order set forth below (37 C.F.R. § 41.37(c)(i)):

I REAL PARTY IN INTEREST

II RELATED APPEALS AND INTERFERENCES

III STATUS OF CLAIMS

IV STATUS OF AMENDMENTS

V SUMMARY OF CLAIMED SUBJECT MATTER

VI GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

VII ARGUMENT

VIII CLAIMS APPENDIX

IX EVIDENCE APPENDIX

X RELATED PROCEEDING APPENDIX

The final page of this brief bears the practitioner's signature.

I REAL PARTY IN INTEREST (37 C.F.R. § 41.37(c)(1)(i))

The real party in interest in this appeal is Nvidia Corporation.

II RELATED APPEALS AND INTERFERENCES (37 C.F.R. § 41.37(c) (1)(ii))

With respect to other prior or pending appeals, interferences, or related judicial proceedings that will directly affect, or be directly affected by, or have a bearing on the Board's decision in the pending appeal, there are no other such appeals, interferences, or related judicial proceedings.

A Related Proceedings Appendix is appended hereto.

III STATUS OF CLAIMS (37 C.F.R. § 41.37(c) (1)(iii))

A. TOTAL NUMBER OF CLAIMS IN APPLICATION

Claims in the application are: 1-3 and 5-19

B. STATUS OF ALL THE CLAIMS IN APPLICATION

1. Claims withdrawn from consideration: None
2. Claims pending: 1-3 and 5-19
3. Claims allowed: None
4. Claims rejected: 1-3 and 5-19
5. Claims cancelled: 4

C. CLAIMS ON APPEAL

The claims on appeal are: 1-3 and 5-19

See additional status information in the Appendix of Claims.

IV STATUS OF AMENDMENTS (37 C.F.R. § 41.37(c)(1)(iv))

As to the status of any amendment filed subsequent to final rejection, the Amendment submitted on 06/09/2008 appears to have been entered by the Examiner.

V SUMMARY OF CLAIMED SUBJECT MATTER (37 C.F.R. § 41.37(c)(1)(v))

With respect to a summary of Claim 1, as shown in Figure 4 et al., a method for computer graphics processing is provided. In use, a value (x) is modified based on an algorithm, and an operation on pixel data is performed taking into account the modified value (e.g. see operation 404 of Figure 4, etc.). Additionally, the value is modified utilizing the equation: $x + \Delta (X)$, where Δ includes a value read from a texture map. Further, the modifying is based on a depth-component of the algorithm (e.g. see operation 402 of Figure 4, etc.). See, for example, Page 3, lines 4-6; and Page 6, lines 14-15 et al.

With respect to a summary of Claim 5, as shown in Figure 4 et al., a method for computer graphics processing is provided. In use, a value (x) is modified based on an algorithm, and an operation is performed on pixel data taking into account the modified value (e.g. see operation 404 of Figure 4, etc.). Additionally, the value is modified utilizing the equation: $x + \Delta (X)$, where Δ includes a value read from a texture map. Further, the modifying allows a lighting operation to display an interaction of displayed objects. See, for example, Page 3, lines 4-6; and Page 8, lines 10-12 et al.

With respect to a summary of Claim 16, as shown in Figure 4 et al., computer program embodied on a computer readable medium for computer graphics processing comprises a code segment for modifying a value (x) based on an algorithm, and a code segment for performing an operation on pixel data taking into account the modified value (e.g. see operation 404 of Figure 4, etc.). Additionally, the value is modified utilizing the equation: $x + \Delta (X)$, where Δ includes a value read from a texture map. Further, the modifying is based on a depth-component of the algorithm (e.g. see operation 402 of Figure 4, etc.). See, for example, Page 3, lines 4-6; and Page 6, lines 14-15 et al.

With respect to a summary of Claim 17, as shown in Figure 4 et al., system including a tangible computer readable medium for computer graphics processing comprises a graphics subsystem, where the graphics subsystem is adapted for modifying a value (x) based on an algorithm, and performing an operation on pixel data taking into account the modified value (e.g. see operation 404 of Figure 4, etc.). Additionally, the value is modified utilizing the equation: $x + \Delta (X)$,

where Δ includes a value read from a texture map. Further, the modifying is based on a depth-component of the algorithm (e.g. see operation 402 of Figure 4, etc.). See, for example, Page 3, lines 4-6; and Page 6, lines 14-15 et al.

Of course, the above citations are merely examples of the above claim language and should not be construed as limiting in any manner.

VI GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL (37 C.F.R. § 41.37(c)(1)(vi))

Following, under each issue listed, is a concise statement setting forth the corresponding ground of rejection.

Issue # 1: The Examiner has rejected Claims 1-3, 5-15, and 18-19 under 35 U.S.C. 101 as being directed to non-statutory subject matter.

Issue # 2: The Examiner has rejected Claims 1-3, 5-6, 8, 16, and 17 under 35 U.S.C. 103(a) as being unpatentable over Aleksic (U.S. Patent No. 6,175,368), in view of Cosman (U.S. Patent No. 6,525,740), and further in view of Salomon ("Computer Graphics and Geometric Modeling").

Issue # 3: The Examiner has rejected Claims 7 and 9-11 under 35 U.S.C. 103(a) as being unpatentable over Aleksic (U.S. Patent No. 6,175,368), in view of Cosman (U.S. Patent No. 6,525,740), in view of Salomon ("Computer Graphics and Geometric Modeling"), in view of Leather et al. (U.S. Patent No. 6,664,958), and further in view of Foran et al. (U.S. Patent No. 5,742,749).

Issue # 4: The Examiner has rejected Claims 12-13 under 35 U.S.C. 103(a) as being unpatentable over Aleksic (U.S. Patent No. 6,175,368), in view of Cosman (U.S. Patent No. 6,525,740), in view of Salomon ("Computer Graphics and Geometric Modeling"), and further in view of Demers et al. (U.S. Patent No. 6,700,586).

Issue # 5: The Examiner has rejected Claims 14-15 under 35 U.S.C. 103(a) as being unpatentable over Aleksic (U.S. Patent No. 6,175,368), in view of Cosman (U.S. Patent No. 6,525,740), in view of Salomon ("Computer Graphics and Geometric Modeling"), in view of Demers et al. (U.S. Patent No. 6,700,586), and further in view of Jenkins (U.S. Patent No. 6,028,608).

Issue # 6: The Examiner has rejected Claims 18 and 19 under 35 U.S.C. 103(a) as being unpatentable over Aleksic (U.S. Patent No. 6,175,368), in view of Cosman (U.S. Patent No.

6,525,740), in view of Salomon ("Computer Graphics and Geometric Modeling"), in view of Leather et al. (U.S. Patent No. 6,664,958), in view of Foran et al. (U.S. Patent No. 5,742,749), and further in view of Akeley et al. (U.S. Patent No. 5,819,017).

VII ARGUMENT (37 C.F.R. § 41.37(c)(1)(vii))

The claims of the groups noted below do not stand or fall together. In the present section, appellant explains why the claims of each group are believed to be separately patentable.

Issue # 1:

The Examiner has rejected Claims 1-3, 5-15, and 18-19 under 35 U.S.C. 101 as being directed to non-statutory subject matter.

Group #1: Claims 1-3, 5-15, and 18-19

Specifically, in the Office Action dated 05/14/2009, the Examiner has "interpret[ed] that claims 1-3, 5-15, and 18-19 are directed to a mathematical procedure, which is an abstract idea that do[es] not correspond to any specific real world data" and has argued that "[a] machine is not required in performing of any of the steps of the claims, and therefore is neither an explicitly recited structural tie nor inherently involved in the step" and that "[t]herefore, the claims are not properly tied."

Appellant respectfully disagrees and notes that the subject matter that courts have found to be outside of, or exceptions to, such four statutory categories of invention is limited to abstract ideas, laws of nature and natural phenomena. In the present case, the claims at issue clearly do not fall into such categories. Further, even if the Examiner were to attempt to argue that the claims at issue did allegedly fall into such categories, appellant asserts that the claims are clearly directed to a practical application thereof.

Per MPEP 2106, "[a] claimed invention is directed to a practical application of a 35 U.S.C. 101 judicial exception when it:

(A) "transforms" an article or physical object to a different state or thing; or

(B) otherwise produces a useful, concrete and tangible result."

In the present case, appellant teaches and claims "**performing an operation** on pixel data" (see Claims 1 and 5 – emphasis added), as claimed. By virtue of the claimed "performing," as claimed, appellant clearly teaches and claims a "transformation" of an article or physical object to a different state or thing. Further, appellant claims "**modifying a value (x)** based on an algorithm" (see Claims 1 and 5 – emphasis added), as claimed. Such specifically claimed substantial limitations clearly constitute a useful feature that provides a tangible real-world result, namely "modified value," which can be substantially repeatable or substantially produce the same result again.

For these and various other reasons, appellant respectfully contends that the claims at issue clearly meet the requirements of 35 U.S.C. 101.

Issue # 2:

The Examiner has rejected Claims 1-3, 5-6, 8, 16, and 17 under 35 U.S.C. 103(a) as being unpatentable over Aleksic (U.S. Patent No. 6,175,368), in view of Cosman (U.S. Patent No. 6,525,740), and further in view of Salomon ("Computer Graphics and Geometric Modeling").

Group #1: Claims 1-3, 6, 8, 16, and 17

With respect to independent Claims 1, 16, and 17, the Examiner has relied on Col. 3, lines 4-6 from Aleksic, in addition to Col. 1, lines 55-57 and Col. 6, lines 15-50 from Cosman, to make a prior art showing of appellant's claimed technique "wherein the modifying is based on a depth-component of the algorithm."

Specifically, the Examiner has argued that "Aleksic... teaches modifying is based on the normal shading component." In addition, the Examiner has argued that "Cosman teaches [calculating] angular tilts U and V from the values in [a] height map and stored in bump angle memory," that "the angular tilt of the bump map is considered...equivalent to the normal vector as both the angular tilt and the normal vector represents the curvature of the bump map," and that "[the] height map is the functional equivalent of a depth map." The Examiner has further argued that

"therefore, Cosman teaches [deriving] the normal vector from the depth map (depth-component)," that "Aleksic already teaches that modifying is based on the normal vector," and that "[the] values of [the] height map correspon[d] to the depth value."

Appellant respectfully disagrees and notes that the above excerpts relied on by the Examiner merely teach that "[t]he bump-shading component (ΔN•L) is then combined with the normal shading component (N•L) to produce the shading function for the given pixel" (Aleksic, Col. 3, lines 4-6). The excerpts further teach that '[t]o create the illusion of bumps, a bump texture map contains values for each texel, that define the local "tip" or "tilt" which is applied to the instantaneous surface normal' (Cosman, Col, 1, lines 55-57).

Additionally, the excerpts teach that "the bump curvature values are related to the largest absolute difference in the tilt values of the surrounding texels which in turn is related to the absolute height values of the bump map," and that "the angular tilts U and V are calculated by the angle processor 42 from the values in the height map 40 and stored in bump angle memory 44" (Cosman, Col, 6, lines 23-38).

Thus, as noted above, Aleksic only discloses that the bump-shading component (ΔN•L) is combined with the normal shading component (N•L), which does <u>not</u> suggest that the normal shading component of Aleksic is the same as the angular tilts of Cosman, as suggested by the Examiner. Thus, merely disclosing that angular tilts are calculated by the angle processor from the values in the height map, in addition to disclosing that a bump-shading component is combined with a normal shading component to produce a shading function for a given pixel, fails to teach a technique "wherein the <u>modifying</u> is <u>based on a depth-component</u> of the <u>algorithm</u>" (emphasis added), as claimed.

Additionally, the Examiner has argued that "Aleksic teaches modifying a value (x) (N summed with ΔN produces a resulting vector N + ΔN, which is perpendicular to the bumped surface) based on an algorithm (addition corresponds to algorithm)," and has further argued that "modifying is based on the normal shading component... [as shown in] col. 1, lines 52-57, col. 3 lines 4-6... col. 4 lines 1-35, col. 6 lines 25-32, col. 10 lines 2-19." Further still, the Examiner has argued that "it should be noted that [a] normal shading component is a product of a normal

vector of a[n] object and a light vector" and that "when vector N + ΔN is multiplied with the light vector L, it results in the desired shading function for this... particular pixel location and thus determine[s] bump mapping pixel-by-pixel" in addition to arguing that "the display value of a pixel is thus determined using the bump-shading component and a normal shading component, which includes a normal vector."

Appellant respectfully disagrees and notes that the above excerpts from Aleksic relied on by the Examiner merely disclose that "[t]he bumping process... begins by determining a normal vector (N) of the object, where the normal vector is perpendicular to the planer surface of the object" (Col. 1, lines 53-57 – emphasis added). Additionally, the excerpts teach that "[t]he bump-shading component (ΔN•L) is... combined with the normal shading component (N•L) to produce the shading function for the given pixel" (Col. 3, lines 4-6 – emphasis added). Further, the excerpts disclose that "[t]he combining circuit 30 receives the color information 46, the texel information 48 and the bump intensity value 44," that "the combining circuit 30 receives a normal shading function (N•L) and combines the normal shading function with the bump intensity value 44 to obtain a resulting shading function (N•L)+(ΔN•L)," and that "[t]he combining circuit 30 then combines the resulting shading function with the color information 46, and the texel information 48 to produce display data 50 for a given pixel" (Col. 4, lines 22-30 – emphasis added).

Further still, the excerpts disclose that "[t]he first computing module 121 receives a light vector L, which represents the vector of at least one light source relating to the graphical images to be displayed" as well as "an object vector N, which represents the normal vector of the object being rendered," and that "[t]he first computing module 121 combines the vectors to produce a normal shading function 156 (N•L)" (Col. 6, lines 25-32 – emphasis added). Also, the excerpts teach that "the normalized vector N of the object is summed with the ΔN vector of the bump surface to produce the resulting vector N+ΔN," that "[t]he resulting vector is perpendicular to the bumped surface," and that '[b]y performing a dot product with the light vector L and the resulting vector N+ΔN produces the desired shadowing function for this particular pixel location" (Col. 10, lines 10-15).

However, merely determining a normal vector for an object, combining a bump-shading component with a normal shading component to produce a shading function for a given pixel, combining a shading function with a bump intensity value to obtain a resulting shading function, combining light and object vectors to produce a normal shading function, and summing a normalized vector with a ΔN vector of the bump surface to produce a resulting vector, as in Aleksic, does <u>not</u> suggest that the <u>normal shading component</u> of Aleksic is the same as the <u>angular tilts</u> of Cosman, as suggested by the Examiner. Therefore, the above excerpt language, in addition to calculating angular tilts by an angle processor from the values in the height map, as in Cosman, fails to teach a technique "wherein the <u>modifying</u> is <u>based on a depth-component</u> of the <u>algorithm</u>" (emphasis added), as claimed by appellant.

Further, the Examiner has argued that "the Cosman reference deals with a three-dimensional image (see col. 4 lines 34-36)" that "the texel tilt values are generated using a height map (col. 6 lines 40-41)," and that "lines 30-33 of Cosman teach bump U and V values, and further teaches that each of the curvature values are derived from the bump values at each associated MIP level of detail." Additionally, the Examiner has argued that "bump U and V values are the same as bump values used to derive the curvature values" and that "[a]lthough Aleksic and Cosman... do not explicitly teach that the normal vector of a bump map depends on its curvature... Salomon teaches exactly the same (pg. 555; the derivatives of the unit normal vector depend on the curvature of the surface)."

Appellant respectfully disagrees and notes that the excerpts from Cosman relied on by the Examiner merely disclose "displaying a three-dimensional image with realistic specular highlights" (Col. 4, lines 35-36), in addition to disclosing that "the preferred method for <u>generating the texel tilt values</u> uses a height map" (Col. 6, lines 40-41 – emphasis added), that "[t]he curvature values comprise a bump map component which can be used with MIP maps and <u>tri-linearly blended just like the bump U and V values</u>," and that "[e]ach of the <u>curvature values are derived from the bump values</u> at each associated MIP level of detail" (Col. 6, lines 30-34 – emphasis added). Further, the excerpt from Salomon relied on by the Examiner discloses that "the <u>derivatives n_u and n_w of the unit normal</u> depend on the curvature of the surface," where "the normal is the cross-product [of the two partial derivatives of the surface]" and where "[i]f the

surface is not highly curved, the magnitudes of those derivatives are small and they can be ignored" (Page 555, second and third paragraphs – emphasis added).

However, merely disclosing that texel tilt values are generated using a height map, and that curvature values are derived from bump values, as in Cosman, and further disclosing that derivatives of a unit normal depend on the curvature of the surface, where derivatives of a surface that is not highly curved can be ignored, as in Salomon, fails to disclose a technique "wherein the modifying is based on a depth-component of the algorithm" (emphasis added), as claimed by appellant. Merely generating texel tilt values using a height map and deriving curvature values from bump values, as in Cosman, in addition to disclosing that derivatives of a unit normal depend on surface curvature in that derivatives of a surface that is not highly curved can be ignored, as in Salomon, fail to disclose a technique "wherein the **modifying** is **based on a depth-component** of the **algorithm**" (emphasis added), as specifically claimed by appellant.

Additionally, the Examiner alleges that "the [appellant] argues '... the normal shading component of Aleksic is the same as the angular tilts of Cosman.'" Appellant respectfully disagrees and notes that the above assertion was made by the Examiner, not appellant. Additionally, appellant respectfully points out the above arguments which clearly demonstrate that the excerpts from Aleksic relied on by the Examiner do not suggest that the normal shading component of Aleksic is the same as the angular tilts of Cosman, as suggested by the Examiner.

In the Office Action dated 05/14/2009, the Examiner has failed to specifically respond to all of appellant's above arguments. Thus, a notice of allowance or specific prior art showing of each of the foregoing claim elements, in combination with the remaining claimed features, is respectfully requested.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of

success must both be found in the prior art and not based on appellant's disclosure. *In re Vaeck,* 947 F.2d 488, 20 USPQ2d 1438 (Fed.Cir.1991).

Appellant respectfully asserts that at least the third element of the *prima facie* case of obviousness has not been met, since the prior art excerpts, as relied upon by the Examiner, fail to teach or suggest <u>all</u> of the claim limitations, as noted above.

Group #2: Claim 5

With respect to independent Claim 5, the Examiner has relied on Col. 3, lines 4-6 from Aleksic, in addition to Col. 1, lines 55-57; Col. 6, lines 15-67; Col. 9, lines 6-15 and 35-67; and Col. 10, lines 1-54 from Cosman to make a prior art showing of appellant's claimed technique "wherein the modifying allows a lighting operation to display an interaction of displayed objects."

Specifically, the Examiner has reiterated the above noted arguments in addition to arguing that the "wave bump map and ocean correspon[d] to displayed objects," and that "raising the brightness of the scene to overall average brightness to compensate for the brightness decrease in areas near the specular highlight corresponds to applying a lighting operation."

Appellant respectfully disagrees. As noted above, Col. 3, lines 4-6 in Aleksic, in addition to Col. 1, lines 55-57 and Col. 6, lines 15-67 in Cosman, merely disclose that angular tilts are calculated by the angle processor from the values in the height map, and that a bump-shading component is combined with a normal shading component to produce a shading function for a given pixel. Clearly, such excerpts do not even suggest that "the modifying allows a <u>lighting operation to display an interaction of displayed objects</u>" (emphasis added), as claimed.

Additionally, the above excerpts relied on by the Examiner merely teach that "[t]o compensate for the brightness decrease in areas near the specular highlight a complementary computation is needed to raise the brightness of the scene to an overall average brightness that is believable" (Cosman, Col. 9, lines 12-15). Further, the excerpts teach "a wave bump map on a simulated ocean" and that "[w]here the bumps exist, the modeler can tune the coefficients so that the average brightness of the ocean within the specular area is correct" (Col. 9, lines 53-56).

However, merely disclosing that a complementary computation is needed to raise the brightness of a scene to an overall average brightness, in addition to disclosing a wave bump map and tuning coefficients where the bumps exist, fails to even *suggest* a technique "wherein the modifying allows a lighting operation to display an <u>interaction of displayed objects</u>" (emphasis added), as claimed by appellant.

Additionally, the Examiner has argued that the "wave bump map on a simulated ocean corresponds to the interacti[on] of displayed objects" and that "it should be noted that the actual modification values stored within a polygon to increase the brightness of areas surrounding the highlight will depend on the nature of the bump map."

Appellant respectfully disagrees and notes that Cosman merely discloses that "the actual modification values stored within a polygon to increase the brightness of areas surrounding the highlight will depend on the nature of the bump map" (Col. 9, lines 40-43). Further, Cosman discloses "a wave bump map on a simulated ocean" and that "[w]here the bumps exist, the modeler can tune the coefficients so that the average brightness of the ocean within the specular area is correct" (Col. 9, lines 53-56).

However, merely disclosing that a complementary computation is needed to raise the brightness of a scene to an overall average brightness, where modification values to increase the brightness of areas surrounding the highlight depend on the nature of the bump map, in addition to disclosing a <u>wave bump map</u> as well as the tuning of coefficients where the bumps exist, as in Cosman, fails to even *suggest* a technique "wherein the modifying allows a lighting operation to display an <u>interaction of displayed objects</u>" (emphasis added), in the context claimed by appellant.

Further, the Examiner has argued that "it is known to one of ordinary skill in the art that a normal vector of a bump map represents it's curvature" and that "the angular [tilt] values U and V as taught by Cosman are used to calculate the bump curvature values." Further, the Examiner has argued that the "wave bump map displayed on a simulated ocean generates an interaction between the displayed objects, wave bump map and the ocean, to cause an animation effect," and

that "when the brightness value of the scene is changed, it affects the lighting of the scene as displayed to a viewer."

Appellant respectfully disagrees. For example, appellant respectfully disagrees with the Examiner's allegations that "it is known to one of ordinary skill in the art that a normal vector of a bump map represents it's curvature" and that "the angular [tilt] values U and V as taught by Cosman are used to calculate the bump curvature values" for at least the reasons noted above with respect to independent Claims 1, 16 and 17. Moreover, such allegations by the Examiner do not even suggest a technique "wherein the modifying allows a lighting operation to display an <u>interaction of displayed objects</u>" (emphasis added), in the context claimed by appellant.

Still yet, the excerpts from Cosman relied on by the Examiner simply do not disclose that a "wave bump map displayed on a simulated ocean generates an interaction between the displayed objects, wave bump map and the ocean," as suggested by the Examiner. For example, Col. 9, line 53-Col. 10, line 54 from Cosman which discloses the wave bump map merely teaches that "[w]here the bump exists, the modeler can tune the coefficients so that the average brightness of the ocean within the specular area is correct" (Col. 9, lines 53-56). Clearly, correcting an average brightness of the ocean fails to support the Examiner's argument that a "wave bump map displayed on a simulated ocean generates an interaction between the displayed objects, wave bump map and the ocean." Even so, a "wave bump map displayed on a simulated ocean [which] generates an interaction between the displayed objects, wave bump map and the ocean" does not rise to the level of specificity of appellant's claimed technique "wherein the modifying allows a lighting operation **<u>to display</u>** <u>an interaction of displayed objects</u>" (emphasis added), in the context claimed by appellant.

Additionally, simply noting that "when the brightness value of the scene is changed, it <u>affects the lighting of the scene</u> as displayed to a viewer" (emphasis added), as noted by the Examiner, fails to even suggest a technique "wherein the modifying allows a lighting operation to display <u>an interaction of displayed objects</u>" (emphasis added), as appellant claims.

Further still, the Examiner has argued that "the Cosman reference deals with a three-dimensional image (see col. 4 lines 34-36)" that "the texel tilt values are generated using a height map (col. 6

lines 40-41)," and that "lines 30-33 of Cosman teach bump U and V values, and further teaches that each of the curvature values are derived from the bump values at each associated MIP level of detail." Additionally, the Examiner has argued that "bump U and V values are the same as bump values used to derive the curvature values" and that "[a]lthough Aleksic and Cosman... do not explicitly teach that the normal vector of a bump map depends on its curvature... Salomon teaches exactly the same (pg. 555; the derivatives of the unit normal vector depend on the curvature of the surface)."

Appellant respectfully disagrees and asserts that the Examiner's arguments have not addressed appellant's specific arguments above. Thus, appellant again notes that Cosman merely discloses that <u>texel tilt values are generated</u> using a <u>height map</u>, and that <u>curvature values are derived from bump values</u>, and that Salomon discloses that <u>derivatives</u> of a unit normal depend on the curvature of the surface, where derivatives of a surface that is not highly curved can be ignored. However, merely <u>generating texel tilt values</u> using a height map and <u>deriving curvature values from bump values</u>, as in Cosman, in addition to disclosing that <u>derivatives</u> of a unit normal depend on surface curvature in that <u>derivatives of a surface</u> that is not highly curved <u>can be ignored</u>, as in Salomon, fail to even *suggest* a technique "wherein the modifying allows <u>a lighting operation</u> to display an <u>interaction of displayed objects</u>" (emphasis added), as claimed by appellant.

In the Office Action dated 05/14/2009, the Examiner has failed to specifically respond to all of appellant's above arguments. Thus, a notice of allowance or specific prior art showing of each of the foregoing claim elements, in combination with the remaining claimed features, is respectfully requested.

Again, since at least the third element of the *prima facie* case of obviousness has not been met, a notice of allowance or specific prior art showing of each of the foregoing claim elements, in combination with the remaining claimed features, is respectfully requested.

<u>Issue # 3:</u>

The Examiner has rejected Claims 7 and 9-11 under 35 U.S.C. 103(a) as being unpatentable over Aleksic (U.S. Patent No. 6,175,368), in view of Cosman (U.S. Patent No. 6,525,740), in view of Salomon ("Computer Graphics and Geometric Modeling"), in view of Leather et al. (U.S. Patent No. 6,664,958), and further in view of Foran et al. (U.S. Patent No. 5,742,749).

Group #1: Claims 7 and 9-11

Appellant respectfully asserts that such claims are not met by the prior art for the reasons argued with respect to Issue #2, Group #1.

Issue # 4:

The Examiner has rejected Claims 12-13 under 35 U.S.C. 103(a) as being unpatentable over Aleksic (U.S. Patent No. 6,175,368), in view of Cosman (U.S. Patent No. 6,525,740), in view of Salomon ("Computer Graphics and Geometric Modeling"), and further in view of Demers et al. (U.S. Patent No. 6,700,586).

Group #1: Claims 12-13

Appellant respectfully asserts that such claims are not met by the prior art for the reasons argued with respect to Issue #2, Group #1.

Issue # 5:

The Examiner has rejected Claims 14-15 under 35 U.S.C. 103(a) as being unpatentable over Aleksic (U.S. Patent No. 6,175,368), in view of Cosman (U.S. Patent No. 6,525,740), in view of Salomon ("Computer Graphics and Geometric Modeling"), in view of Demers et al. (U.S. Patent No. 6,700,586), and further in view of Jenkins (U.S. Patent No. 6,028,608).

Group #1: Claim 14

With respect to Claim 14, the Examiner has relied on Col. 53, lines 56-67; and Col. 54, line 38 from the Jenkins reference to make a prior art showing of appellant's claimed technique "wherein y equals three (3)." Further, the Examiner has argued that "Jenkins teaches a case when [the] viewpoint motion vector is parallel to [the] view direction vector, object space x and y values are constant while [the] z value varies."

Appellant respectfully disagrees and notes that the above excerpts relied on by the Examiner merely teach a "case of viewpoint motion with a constant view direction vector" (Col. 53, lines 56-57) and a "transform [of] x and y object-space values" (Col. 54, lines 37-38). However, nowhere in the cited excerpts is a technique taught "wherein y equals three (3)," especially where "X includes (n • $\mathbf{T}_{proj}$[y])" and "where $\mathbf{T}_{proj}$[y] includes the projection transform" (see Claim 13), in the context claimed.

Additionally, the Examiner has further argued that "the dot product calculation between the normals and the matrix corresponds to (n*T_{proj}[y]), which further implies that X includes the dot product calculation between the normals and the matrix" and that "it should be noted [that] although the reference does not use the same terminology as the claimed invention, the functional equivalents of the related terms [have] been suggested by the examiner." Further, the Examiner has argued that "by y = 3 and y = 4, the examiner interprets [that] the value of y stays constant during the transformation process."

Appellant respectfully disagrees and again notes that the above excerpts relied on by the Examiner merely teach a "case of viewpoint motion with a constant view direction vector" (Col. 53, lines 56-57) and a "transform [of] x and y object-space values" (Col. 54, lines 37-38). However, nowhere in the cited excerpts is a technique taught "wherein y equals three (3)," especially where "X includes (n • $\mathbf{T}_{proj}$[y])" and "where $\mathbf{T}_{proj}$[y] includes the projection transform" (see Claim 13), in the context claimed.

Further, the Examiner has argued that "the language of the claims do[es] not suggest that [the] claimed invention cannot be a case of viewpoint motion with a constant view direction vector and a transform of x and y object-space values."

Appellant respectfully disagrees. First, appellant again notes that appellant specifically claims a technique "wherein y equals three (3)," as claimed. Additionally, appellant again notes that the above excerpts relied on by the Examiner merely teach a "case of viewpoint motion with a constant view direction vector" (Col. 53, lines 56-57) and a "transform [of] x and y object-space values" (Col. 54, lines 37-38). However, nowhere in the cited excerpts is a technique taught "wherein y equals three (3)," especially where "X includes (n • $\mathbf{T}_{proj}$[y])" and "where $\mathbf{T}_{proj}$[y] includes the projection transform" (see Claim 13), in the context claimed.

In the Office Action dated 05/14/2009, the Examiner has failed to specifically respond to all of appellant's above arguments. Thus, a notice of allowance or specific prior art showing of each of the foregoing claim elements, in combination with the remaining claimed features, is respectfully requested.

Again, since at least the third element of the *prima facie* case of obviousness has not been met, a notice of allowance or specific prior art showing of each of the foregoing claim elements, in combination with the remaining claimed features, is respectfully requested.

Group #2: Claim 15

With respect to Claim 15, the Examiner has relied on Col. 53, lines 56-67; and Col. 54, line 38 from the Jenkins reference to make a prior art showing of appellant's claimed technique "wherein y equals four (4)." Further, the Examiner has argued that "Jenkins teaches a case when [the] viewpoint motion vector is parallel to [the] view direction vector, object space x and y values are constant while [the] z value varies."

Appellant respectfully disagrees and notes that the above excerpts relied on by the Examiner merely teach a "case of viewpoint motion with a constant view direction vector" (Col. 53, lines 56-57) and a "transform [of] x and y object-space values" (Col. 54, lines 37-38). However, nowhere in the cited excerpts is a technique taught "wherein y equals four (4)," especially where "X includes (n • $\mathbf{T}_{proj}$[y])" and "where $\mathbf{T}_{proj}$[y] includes the projection transform" (see Claim 13), in the context claimed.

Additionally, the Examiner has further argued that "the dot product calculation between the normals and the matrix corresponds to ($n*T_{proj}[y]$), which further implies that X includes the dot product calculation between the normals and the matrix" and that "it should be noted [that] although the reference does not use the same terminology as the claimed invention, the functional equivalents of the related terms [have] been suggested by the examiner." Further, the Examiner has argued that "by y = 3 and y = 4, the examiner interprets [that] the value of y stays constant during the transformation process."

Appellant respectfully disagrees and again notes that the above excerpts relied on by the Examiner merely teach a "case of viewpoint motion with a constant view direction vector" (Col. 53, lines 56-57) and a "transform [of] x and y object-space values" (Col. 54, lines 37-38). However, nowhere in the cited excerpts is a technique taught "wherein y equals four (4)," especially where "X includes ($n \bullet \mathbf{T}_{proj}[y]$)" and "where $\mathbf{T}_{proj}[y]$ includes the projection transform" (see Claim 13), in the context claimed.

Further, the Examiner has argued that "the language of the claims do[es] not suggest that [the] claimed invention cannot be a case of viewpoint motion with a constant view direction vector and a transform of x and y object-space values."

Appellant respectfully disagrees. First, appellant again notes that appellant specifically claims a technique "wherein y equals four (4)," as claimed. Additionally, appellant again notes that the above excerpts relied on by the Examiner merely teach a "case of viewpoint motion with a constant view direction vector" (Col. 53, lines 56-57) and a "transform [of] x and y object-space values" (Col. 54, lines 37-38). However, nowhere in the cited excerpts is a technique taught "wherein y equals four (4)," especially where "X includes ($n \bullet \mathbf{T}_{proj}[y]$)" and "where $\mathbf{T}_{proj}[y]$ includes the projection transform" (see Claim 13), in the context claimed.

In the Office Action dated 05/14/2009, the Examiner has failed to specifically respond to all of appellant's above arguments. Thus, a notice of allowance or specific prior art showing of each of the foregoing claim elements, in combination with the remaining claimed features, is respectfully requested.

Again, since at least the third element of the *prima facie* case of obviousness has not been met, a notice of allowance or specific prior art showing of each of the foregoing claim elements, in combination with the remaining claimed features, is respectfully requested.

Issue # 6:

The Examiner has rejected Claims 18 and 19 under 35 U.S.C. 103(a) as being unpatentable over Aleksic (U.S. Patent No. 6,175,368), in view of Cosman (U.S. Patent No. 6,525,740), in view of Salomon ("Computer Graphics and Geometric Modeling"), in view of Leather et al. (U.S. Patent No. 6,664,958), in view of Foran et al. (U.S. Patent No. 5,742,749), and further in view of Akeley et al. (U.S. Patent No. 5,819,017).

Group #1: Claims 18 and 19

Appellant respectfully asserts that such claims are not met by the prior art for the reasons argued with respect to Issue #2, Group #1.

In view of the remarks set forth hereinabove, all of the independent claims are deemed allowable, along with any claims depending therefrom.

VIII CLAIMS APPENDIX (37 C.F.R. § 41.37(c)(1)(viii))

The text of the claims involved in the appeal (along with associated status information) is set forth below:

1. (Previously Presented) A method for computer graphics processing, comprising:
modifying a value (x) based on an algorithm; and
performing an operation on pixel data taking into account the modified value;
wherein the value is modified utilizing the equation:
$x + \Delta (X)$,
where Δ includes a value read from a texture map;
wherein the modifying is based on a depth-component of the algorithm.

2. (Original) The method as recited in claim 1, wherein the pixel data includes a normal value, and further comprising modifying the normal value.

3. (Original) The method as recited in claim 1, wherein the operation includes a lighting operation.

4. (Cancelled)

5. (Previously Presented) A method for computer graphics processing, comprising:
modifying a value (x) based on an algorithm; and
performing an operation on pixel data taking into account the modified value;
wherein the value is modified utilizing the equation:
$x + \Delta (X)$,
where Δ includes a value read from a texture map;
wherein the modifying allows a lighting operation to display an interaction of displayed objects.

6. (Original) The method as recited in claim 3, wherein the modifying allows the lighting operation to display bumpy shadows.

7. (Original) The method as recited in claim 1, wherein the operation includes a hidden surface calculation.

8. (Original) The method as recited in claim 1, wherein the operation includes a shadow mapping operation.

9. (Original) The method as recited in claim 1, wherein the value includes a depth-value.

10. (Original) The method as recited in claim 9, wherein the value includes a clip-space z-value.

11. (Original) The method as recited in claim 9, wherein the value includes a clip-space w-value.

12. (Original) The method as recited in claim 1, wherein X involves a projection transform.

13. (Original) The method as recited in claim 12, wherein X includes ($n \bullet \mathbf{T}_{proj}[y]$), where $\mathbf{T}_{proj}[y]$ includes the projection transform, and n includes a vector.

14. (Original) The method as recited in claim 13, wherein y equals three (3).

15. (Original) The method as recited in claim 13, wherein y equals four (4).

16. (Previously Presented) A computer program embodied on a computer readable medium for computer graphics processing, comprising:

a code segment for modifying a value (x) based on an algorithm; and

a code segment for performing an operation on pixel data taking into account the modified value;

wherein the value is modified utilizing the equation:

$$x + \Delta (X),$$

where Δ includes a value read from a texture map;

wherein the modifying is based on a depth-component of the algorithm.

17. (Previously Presented) A system including a tangible computer readable medium for computer graphics processing, comprising:

a graphics subsystem, the graphics subsystem adapted for modifying a value (x) based on an algorithm, and performing an operation on pixel data taking into account the modified value;

wherein the value is modified utilizing the equation:

$x + \Delta (X)$,

where Δ includes a value read from a texture map;

wherein the modifying is based on a depth-component of the algorithm.

18. (Previously Presented) The method as recited in claim 10, wherein the clip-space z-value is extracted using a projection transform.

19. (Previously Presented) The method as recited in claim 11, wherein the clip-space w-value is extracted using a projection transform.

IX EVIDENCE APPENDIX (37 C.F.R. § 41.37(c)(1)(ix))

There is no such evidence.

X RELATED PROCEEDING APPENDIX (37 C.F.R. § 41.37(c)(1)(x))

N/A

In the event a telephone conversation would expedite the prosecution of this application, the Examiner may reach the undersigned at (408) 971-2573. For payment of any additional fees due in connection with the filing of this paper, the Commissioner is authorized to charge such fees to Deposit Account No. 50-1351 (Order No. NVIDP015A).

Respectfully submitted,

By: /KEVINZILKA/ Date: January 14, 2010

Kevin J. Zilka
Reg. No. 41,429

Zilka-Kotab, P.C.
P.O. Box 721120
San Jose, California 95172-1120
Telephone: (408) 971-2573
Facsimile: (408) 971-4660